

AIR FORCE QUALIFICATION TRAINING PACKAGE (AFQTP)



for
ELECTRICAL POWER PRODUCTION
(3E0X2)

MODULE 30
AFSC SPECIFIC CONTINGENCY RESPONSIBILITIES

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AIR FORCE QUALIFICATION TRAINING PACKAGES
for
ELECTRICAL POWER PRODUCTION
(3E0X2)

INTRODUCTION

Before starting this AFQTP, refer to and read the “Trainee/Trainer Guide” located on the AFCESA Web site <http://www.afcesa.af.mil/>

AFQTPs are mandatory and must be completed to fulfill task knowledge requirements on core and diamond tasks for upgrade training. *It is important for the trainer and trainee to understand* that an AFQTP **does not** replace hands-on training, nor will completion of an AFQTP meet the requirement for core task certification. AFQTPs will be used in conjunction with applicable technical references and hands-on training.

AFQTPs and Certification and Testing (CerTest) must be used as minimum upgrade requirements for Diamond tasks.

MANDATORY minimum upgrade requirements:

Core task:

AFQTP completion
Hands-on certification using the included Performance Checklist

Diamond task:

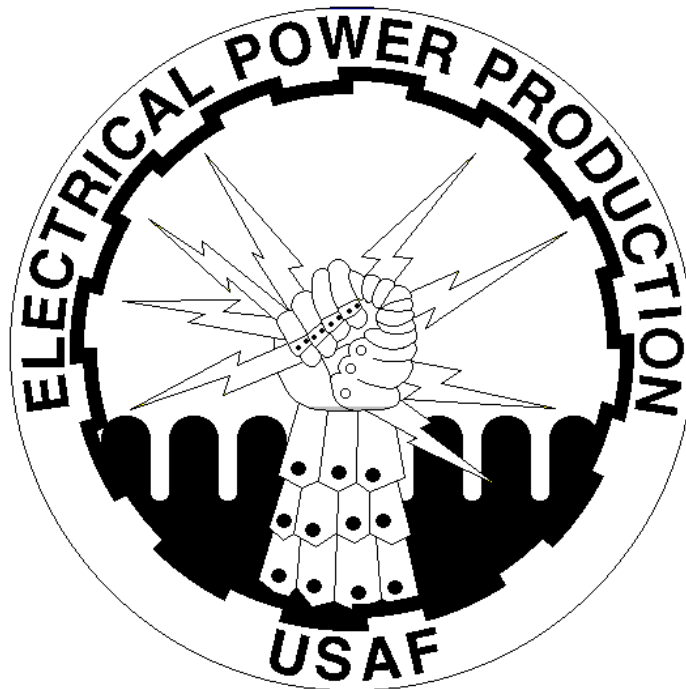
AFQTP completion
CerTest completion (80% minimum to pass)

Note: *Trainees will receive hands-on certification using the included Performance Checklist when equipment becomes available either at home station or at a TDY location.*

Put this package to use. Subject matter experts under the direction and guidance of HQ AFCESA/CEOT revised this AFQTP. If you have any recommendations for improving this document, please contact the Electrical Power Production Career Field Manager at the address below.

HQ AFCESA/CEOT
139 Barnes Dr. Suite 1
Tyndall AFB, FL 32403-5319
DSN: 523-6392, Comm: (850) 283-6392
Fax: DSN 523-6488
E-mail: ceott.helpdesk@afcesa.af.mil

Notice. This AFQTP is **NOT** intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.



MOBILE AIRCRAFT ARRESTING SYSTEM (MAAS) - INSTALLATION

MODULE 30

AFQTP UNIT 1

CONCRETE (30.1.1.1.3.1.)

SOIL (30.1.1.1.3.2.)

ASPHALT OVER SOIL (30.1.1.1.3.3)

ASPHALT OVER CONCRETE (30.1.1.1.3.4.)

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

INSTALLATION

Task Training Guide

STS Reference Number/Title:	30.1.1.1.3.1., Concrete 30.1.1.1.3.2., Soil 30.1.1.1.3.3., Asphalt Over Soil 30.1.1.1.3.4., Asphalt Over Concrete
Training References:	<ul style="list-style-type: none"> • CD-ROM, (3E0X2-30C, Mobile Aircraft Arresting System) • Local Procedures
Prerequisites:	<ul style="list-style-type: none"> • Possess a 3E032 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none"> • MAAS • Personal safety equipment • General tool kit
Learning Objective:	<ul style="list-style-type: none"> • Install a Mobile Aircraft Arresting System.
Samples of Behavior:	<ul style="list-style-type: none"> • Perform the four different types of installation
Notes:	
<ul style="list-style-type: none"> • To successfully complete this element follow the steps outlined in the applicable technical manual exactly--no exceptions. • Any safety violation is an automatic failure. <p><i>Certification on these tasks requires a minimum of 80 % on the CER-Test administered by the unit Training Manager.</i></p>	

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

INSTALLATION

Background: The Mobile Aircraft Arresting System (MAAS), transportable by air, sea and land aircraft arresting system for quick and/or emergency system installation. The MAAS consists of two identical mobile units; each unit houses one BAK-12 rotary friction energy absorber. It also contains all the basic components of a fixed base arresting system, all the tools and hardware necessary for quick installation and removal. The key to this system is how fast it can be deployed and installed.

The 3E0X2-30C, Mobile Aircraft Arresting System CD-ROM, will instruct you on the following installations: concrete, soil, asphalt over soil, asphalt over concrete.

To accomplish these lessons, complete: Lessons 1-6, CD-ROM, 3E0X1-30C, Mobile Aircraft Arresting System (MAAS)

NOTE: After completing each of the following lessons, see your Unit Education and Training Manager to take the following **mandatory** certests:

<u>Lesson no.</u>	<u>Test no.</u>	<u>Title</u>
3	8012	MAAS QTP, Lesson Three
4	8013	MAAS QTP, Lesson four
5	8014	MAAS QTP, Lesson Five
6	8015	MAAS QTP, Lesson Six

NOTE: After completing each of the following optional lessons, you may see your Unit Education and Training Manager to take the following optional certests:

<u>Lesson no.</u>	<u>Test no.</u>	<u>Title</u>
1	8010	MAAS QTP, Lesson One
2	8011	MAAS QTP, Lesson Two

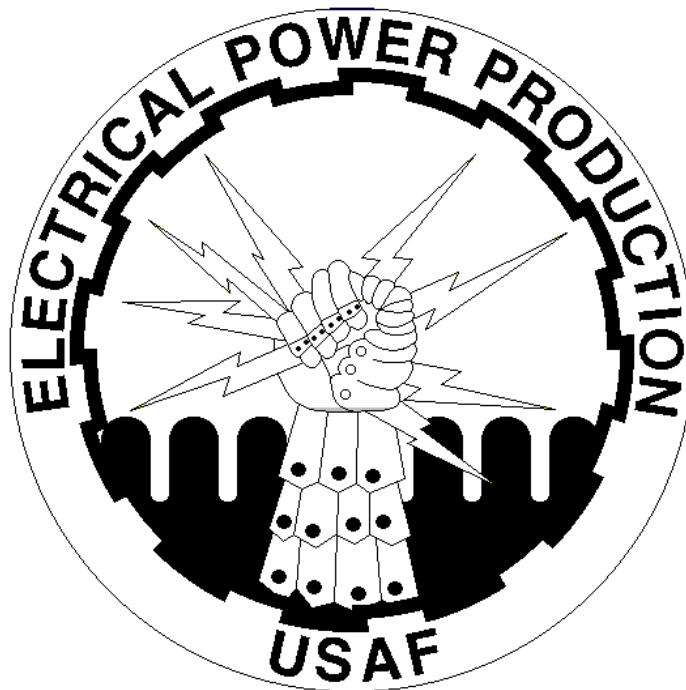
Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

INSTALLATION

Performance Checklist		
Step	Yes	No
Did trainee install the MAAS using the following methods:		
1. Concrete		
2. Soil		
3. Asphalt Over Soil		
4. Asphalt Over Concrete		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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MOBILE AIRCRAFT ARRESTING SYSTEM (MAAS) – PREVENTIVE MAINTENANCE

MODULE 30

AFQTP UNIT 1

DAILY (30.1.1.1.4.1.)
WEEKLY (30.1.1.1.4.2.)
MONTHLY (30.1.1.1.4.3)
QUARTERLY (30.1.1.1.4.4.)
AFTER ARRESTMENT (30.1.1.1.4.7.)

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

MAINTENANCE

Task Training Guide

STS Reference Number/Title:	30.1.1.1.4.1., Daily 30.1.1.1.4.2., Weekly 30.1.1.1.4.3., Monthly 30.1.1.1.4.4., Quarterly 30.1.1.1.4.7., After Arrestment
Training References:	<ul style="list-style-type: none"> • CD-ROM, (3E0X1-30C, Mobile Aircraft Arresting System, MAAS) • Local Procedures
Prerequisites:	<ul style="list-style-type: none"> • Possess a 3E032 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none"> • Personal safety equipment • General tool kit
Learning Objective:	<ul style="list-style-type: none"> • Perform periodic maintenance on the MAAS.
Samples of Behavior:	<ul style="list-style-type: none"> • The trainee will perform periodic maintenance on the MAAS.
Notes:	
<ul style="list-style-type: none"> • To successfully complete this element follow the steps outlined in the applicable technical manual exactly--no exceptions. • Any safety violation is an automatic failure. <p><i>Certification on these tasks requires a minimum of 80 % on the CER-Test administered by the unit Training Manager.</i></p>	

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

Background: The Mobile Aircraft Arresting System (MAAS), transportable by air, sea and land aircraft arresting system for quick and/or emergency system installation. The MAAS consists of two identical mobile units; each unit houses one BAK-12 rotary friction energy absorber. It also contains all the basic components of a fixed base arresting system, all the tools and hardware necessary for quick installation and removal. The key to this system is how fast it can be deployed and installed.

Once installed it is imperative the system is maintained for proper operations. By completing 3E0X2-30C, Mobile Aircraft Arresting System CD-ROM, and reading the applicable TO, you should have no problems performing all the required maintenance.

To accomplish these lessons, complete: Lessons 7 and 8, CD-ROM, 3E0X1-30C Mobile Aircraft Arresting System (MAAS)

NOTE: After completing each of the following lessons, see your Unit Education and Training Manager to take the following **mandatory** certests:

<u>Lesson no.</u>	<u>Test no.</u>	<u>Title</u>
7	8016	MAAS QTP, Lesson Seven
8	8017	MAAS QTP, Lesson Eight

NOTE: After completing each of the following optional lessons on CD-ROM, 3E0X1-30C Mobile Aircraft Arresting System (MAAS), you may see your Unit Education and Training Manager to take the following optional certests:

<u>Lesson no.</u>	<u>Test no.</u>	<u>Title</u>
9	8018	MAAS QTP, Lesson Nine
10	8019	MAAS QTP, Lesson Ten
11	8020	MAAS QTP, Lesson Eleven
12	8021	MAAS QTP, Lesson Twelve

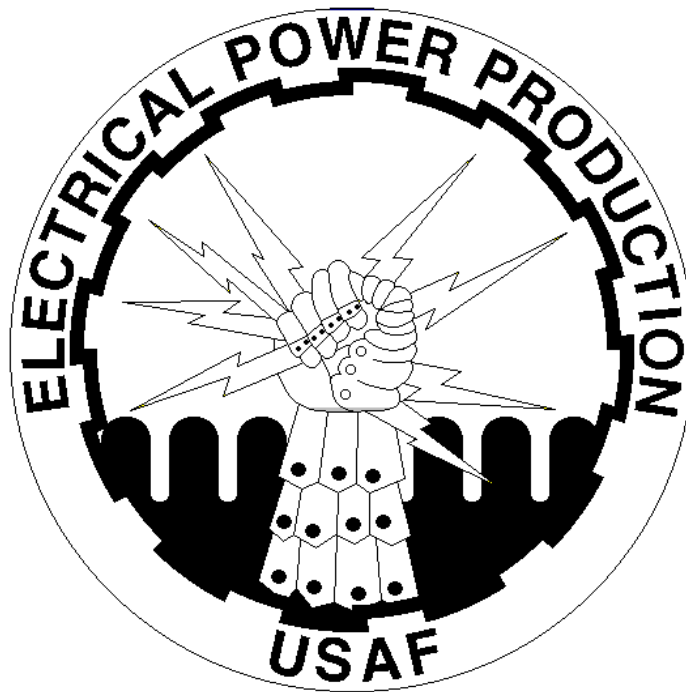
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MAINTENANCE

Performance Checklist		
Step	Yes	No
Did trainee perform the following inspections:		
1. Daily		
2. Weekly		
3. Monthly		
4. Quarterly		
5. After Arrestment		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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MOBILE AIRCRAFT ARRESTING SYSTEM (MAAS) – SPECIAL MAINTENANCE REQUIREMENTS

MODULE 30

AFQTP UNIT 1

TAPE CROP (30.1.1.1.7.1.)
TAPE CONNECTOR (30.1.1.1.7.2.)
REEVE TAPE (30.1.1.1.7.3)
TAPE REPLACEMENT (30.1.1.1.7.4.)

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

MAINTENANCE

Task Training Guide

STS Reference Number/Title:	30.1.1.1.7.1., Tape Crop 30.1.1.1.7.2., Tape Connector 30.1.1.1.7.3., Reeve Tape 30.1.1.1.7.4., Tape Replacement
Training References:	<ul style="list-style-type: none"> • CD-ROM, (3E0X1-30C, Mobile Aircraft Arresting System, MAAS) • Local Procedures
Prerequisites:	<ul style="list-style-type: none"> • Possess a 3E032 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none"> • Personal safety equipment • General tool kit
Learning Objective:	<ul style="list-style-type: none"> • Crop and replace tapes. • Reeve tape connector.
Samples of Behavior:	<ul style="list-style-type: none"> • Properly reeve tape connector, and crop the tapes. • Explain the process involved in replacing the tapes.
Notes:	
<ul style="list-style-type: none"> • To successfully complete this element follow the steps outlined in the applicable technical manual exactly--no exceptions. • Any safety violation is an automatic failure. <p><i>Certification on these tasks requires a minimum of 80 % on the CER-Test administered by the unit Training Manager.</i></p>	

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

Background: The Mobile Aircraft Arresting System (MAAS), transportable be air, sea and land aircraft arresting system for quick and/or emergency system installation. The MAAS consists of two identical mobile units; each unit houses one BAK-12 rotary friction energy absorber. It also contains all the basic components of a fixed base arresting system, all the tools and hardware necessary for quick installation and removal. The key to this system is how fast it can be deployed and installed.

Once installed it is imperative the system is maintained for proper operations. By completing 3E0X2-30C, Mobile Aircraft Arresting System CD-ROM, and reading the applicable TO, you should have no problems performing all the required maintenance.

To accomplish this lesson, complete: Lesson 13, CD-ROM, 3E0X1-30C Mobile Aircraft Arresting System (MAAS)

NOTE: After completing the following lesson, see your Unit Education and Training Manager to take the following **mandatory** certest:

Lesson no.
13

Test no.
8022

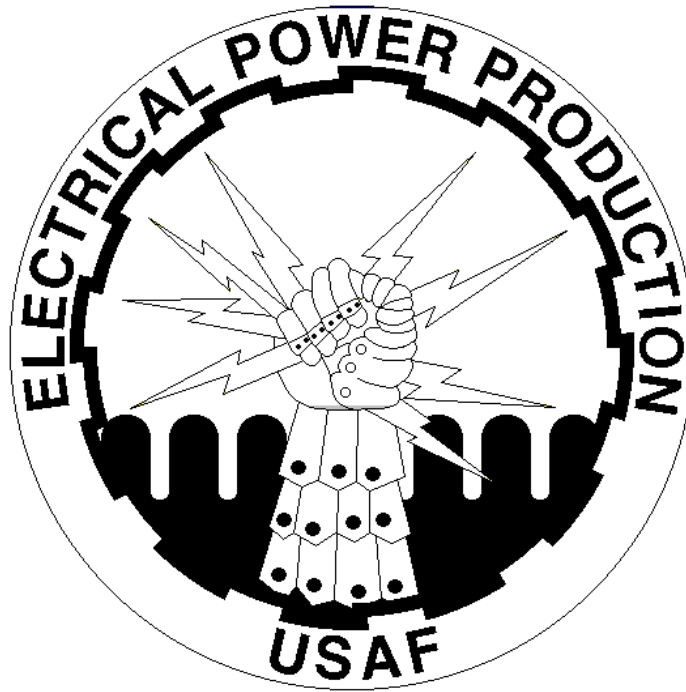
Title
MAAS QTP, Lesson Thirteen

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

MAINTENANCE

Performance Checklist		
Step	Yes	No
1. Did trainee properly crop the tape in accordance with the T.O.? Tape Replacement		
2. Did trainee properly inspect the Tape Connector for wear in accordance with the T.O.?		
3. Did the trainee Reeve Tape Connector properly in accordance with the T.O.?		
4. Did trainee perform tape replacement properly in accordance with T.O. procedures?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer



TELESCOPIC FLOOD LIGHTING SET

MODULE 30

AFQTP UNIT 2

INSTALLATION (30.2.2.2.1.)

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

INSTALLATION

Task Training Guide

STS Reference Number/Title:	30.2.2.2.1., Installation
Training References:	<ul style="list-style-type: none"> • Technical Order 35F5-5-16-1 • Local Procedures
Prerequisites:	<ul style="list-style-type: none"> • Possess a 3E032 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none"> • Model TP-5A4-DC Floodlight Set (TF-1) • Personal safety equipment • General tool kit
Learning Objective:	<ul style="list-style-type: none"> • Install the telescopic flood lighting set, model TP-5A4-DC.
Samples of Behavior:	<ul style="list-style-type: none"> • The trainee will install the telescopic flood lighting set, model TP-5A4-DC.
Notes:	
<ul style="list-style-type: none"> • To successfully complete this element follow the steps outlined in the applicable technical manual exactly--no exceptions. • If this model of floodlight set is not available, modify this AFQTP to certify the trainee on the model you have. • Any safety violation is an automatic failure. 	

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

INSTALLATION

Background: There are several types of floodlight sets used by the Air Force. Some bases use the NF-2, NF-2D, TP-5A4-DC (TF-1), or some other commercial brand floodlight. Even as several makes and models are in use, all these sets have been designed as fast deployable floodlighting units for use as an emergency lighting source in remote areas. In this AFQTP, we will focus our discussion on the model TP-5A4-DC (TF-1) Floodlight Set. The TF-1 is a self-contained floodlight consisting of a 7000-watt generator, four 1000-watt tower lights, four 500-watt tripod lights, 28-foot telescoping tower, and an 11-hp engine.

Installing the TP-5A4-DC light set is relatively simple. Once the telescopic floodlight set is towed into position, the outriggers are extended and the stands are lowered to support, level, and to prevent the unit from rolling. Several checks should be performed before operating the system. Prior to starting the engine, the cabinet doors should be opened and a complete visual inspection performed. An air compressor is used to raise the lights mounted on the tower once the tower is locked into position. If required, remove the ground rod from the holder on the trailer and install.

Placing the staging pin to the “ready” position allows the tower to be moved from the horizontal to the vertical position. Lock the tower into position by carefully tilting the tower from the horizontal to the vertical position. When the locking pin clicks, locking the tower into position, the tower T-bar lights can be installed. Remove the tripod lights from inside the unit and mount them on the tripods. Last, plug in the tripod lights to the circuit breaker panel. Pre-position the light fixtures before raising the tower or tripod extensions.

To Perform the task, follow these steps:

Step 1: Tow floodlight to desired location.

Towing speed is up to 55 mph. The tow vehicle must have a pintle hook hitch and be capable of towing a tongue weight of 165 pounds. Position the front support stand before disconnecting the floodlight from the tow vehicle, this will prevent the floodlight from rolling.

Step 2: Extend the outriggers and lower the support stands.

- These stands act to stabilize, level, and prevent the floodlight from rolling.
- Loosen the outrigger T-bolts, slide them out till they stop, and retighten the T-bolt.
- Pull the jack locking pins and rotate the jacks to the vertical position.
- Telescope the jacks until the unit is level.

SAFETY:

THE STANDS MUST BE LOWERED BEFORE THE TOWER IS RAISED TO PREVENT THE UNIT FROM TILTING OVER.

Step 3: Inspect the floodlight set.

- Visually inspect the entire floodlight unit for signs of physical damage, fluid leaks, and loose or missing parts.

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

Step 4: Perform engine compartment inspection.

- Remove tower lights from the inside storage compartment and visually inspect unit for obvious damage and leaks.

HINT:

Puddles of fluid and dirty areas on the engine normally indicate problem areas and should be investigated and repaired as soon as possible.

Step 5: Inspect the air compressor.

- Check compressor for cleanliness and clean/repair as required.

Step 6: Install equipment ground.

- Connect ground to existing ground rod or remove the ground rod from the holder on the trailer and install.

Step 7: Position tower to the vertical (upright) position.

- Remove the tower hold-down strap.
- Place the tower staging pin to the “ready” position. This allows the tower to tilt to the vertical position.
- Lock the tower in the vertical position by tilting the tower until the locking pin clicks into the “lock” position.
- Connect the air hose to the bottom of the tower.

SAFETY:

THE TOWER IS BOTTOM HEAVY AND CAN CAUSE SERIOUS INJURY.

Step 8: Install tower T-bar lights.

- Remove the T-bar lights from their inside storage position and install on the tower bracket.
- Remove the power cable from the front storage box and connect to the tower connection box.
- Lace the tower cable through the split rings along the tower and ensure that the cable is completely clear of the storage box.
- Plug tower lights into their outlet mounted on the tower.

Step 9: Install tripod lights.

- Remove the tripod lights from their inside storage position and install the lights to the desired location.
- Plug tripod lights into the circuit breaker panel.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

Review Questions for Installation

Question	Answer
1. All of the floodlight sets used in the Air Force are designed as fast deployment floodlight units for use as an emergency lighting source in remote areas.	a. True b. False
2. What are the flood light support stands and outriggers used for?	a. Prevent the unit from sinking b. Prevent the unit from sinking and rolling c. Support the light set and prevent the unit from rolling d. Support the light set and prevent the unit from sinking
3. Which position must the staging pin be in to allow the tower to be moved from the horizontal to the vertical position?	a. Up b. Down c. Ready d. Operate

NOTE: After completing all lessons for Telescopic Flood Lighting Set, see your Unit Education and Training Manager to take the following mandatory certest:

Test no.
8075

Title
Specific Contingency Responsibilities – Power Pro

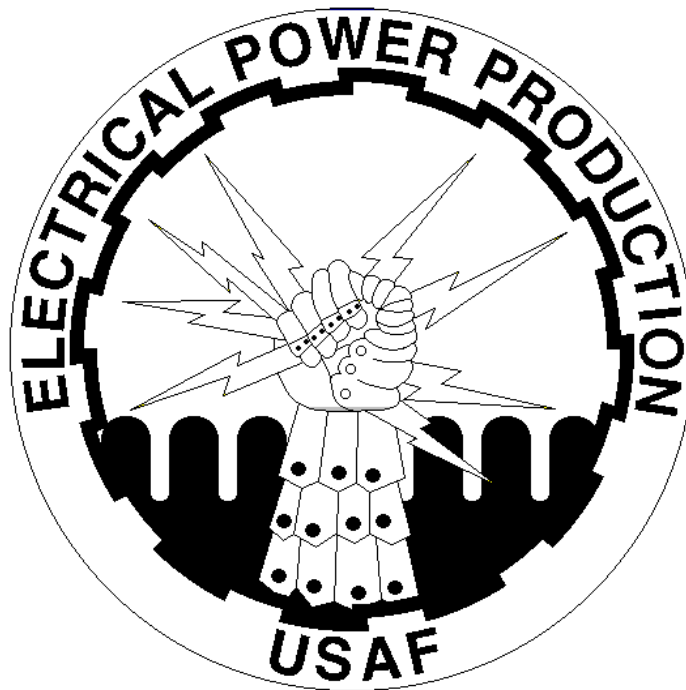
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INSTALLATION

Performance Checklist		
Step	Yes	No
1. Towed floodlight to desired location?		
2. Extended the outriggers and lowered the support stands?		
3. Inspected the floodlight set?		
4. Inspected the engine compartment?		
5. Inspected the air compressor?		
6. Installed equipment ground?		
7. Positioned the tower to the vertical position?		
8. Installed the tower lights?		
9. Installed the tripod lights?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.



TELESCOPIC FLOOD LIGHTING SET

MODULE 30

AFQTP UNIT 2

OPERATION (30.2.2.2.2.)

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

OPERATION

Task Training Guide

STS Reference Number/Title:	30.2.2.2.2., Operation
Training References:	<ul style="list-style-type: none"> • Technical Order 35F5-5-16-1 • Local Procedures
Prerequisites:	<ul style="list-style-type: none"> • Possess a 3E032 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none"> • Model TP-5A4-DC Floodlight set (TF-1) • Personal safety equipment • General tool kit
Learning Objective:	<ul style="list-style-type: none"> • Operate the telescopic flood lighting set, model TP-5A4-DC.
Samples of Behavior:	<ul style="list-style-type: none"> • The trainee will operate the telescopic flood lighting set, model TP-5A4-DC.
Notes:	
<ul style="list-style-type: none"> • To successfully complete this element follow the steps outlined in the applicable technical manual exactly--no exceptions. • If this model of floodlight set is not available, modify this AFQTP to certify the trainee on the model you have. • Any safety violation is an automatic failure. 	

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

OPERATION

Background: The lighting capacity of this unit as equipped is 483,800 lumens of light and it is capable of lighting an area over 7.5 acres. These units can operate in a range of -25 degrees F to +125 degrees F. The tower assembly of the system is capable of reaching a height of 28 feet and withstanding gusts of up to 40 MPH, while the portable tripod withstands gusts up to 15 MPH.

Operation of the floodlight is much simpler than that of a generator set. Place the Run-Stop switch to the “run” position. Heat the system for one minute by depressing the preheat switch to energizes the glow plug. After 60 seconds in extreme cold weather, or 30 seconds on moderate climates, depress the start button to start the engine. The start and preheat buttons must be depressed at the same time to energize the starter motor. Close the air compressor circuit breaker and close the air valve to raise the tower. The final step involves closing the remaining circuit breakers to turn on the tower and tripod lights.

The last thing this AFQTP will discuss is shutting down and storing the floodlight. All the load must be removed from the engine before you shutdown the engine. To remove the load you simply open load and main circuit breakers. Remember to allow ample time for the lights and fixtures to cool before touching them.

To Perform the tasks follow these steps:

Step 1: Install the floodlight set as outlined in AFQTP 3E0X2-30.2.2.2.1

Step 2: Inspect the engine.

1. Check engine oil level and maintain within the full range.
2. Check engine fuel level and maintain to at least half tank.
3. Check battery electrolyte level and adjust to above the cell plates.
4. Check engine for cleanliness and clean/repair as required.
5. Ensure the oil, fuel (18 gallon tank), and battery electrolyte are within operating range.

SAFETY:

REMOVE THE TOWER POWER CABLE AND ENSURE YOU HAVE ADEQUATE OVERHEAD CLEARANCE BEFORE EXTENDING THE TELESOPING TOWER.

Step 3: Inspect the air compressor.

1. Check compressor oil level and maintain within the operating range.
2. Check compressor drive belts and maintain tightness to no more than 3/4-inch deflection.
3. Ensure the oil level is within the operating range.

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

Step 4: Inspect the tower.

With the tower in the locked vertical position, ensure the air hose is properly connected and the air valve is open.

Step 5: Ensure all circuit breakers are off.

Step 6: Preheat engine.

Depress the preheat button for 30 seconds in moderate temperatures and 60 seconds in extreme cold weather (30 degrees F or below).

SAFETY:

LIMIT CRANKING TO 15 OR 20 SECOND INTERVALS AND ALLOW THE STARTER TO COOL FOR ONE MINUTE BETWEEN CRANKING CYCLES. THIS WILL PREVENT DAMAGE TO THE STARTER MOTOR.

Step 7: Start engine.

With the preheat button depressed, depress the start button.

Step 8: Allow the engine RPM to stabilize before applying any load.

The engine should be operated for approximately five minutes before closing any circuit breakers. While the engine is warming, observe the engine and generator instrumentation for proper readings. Adjust unit output voltage as necessary.

Step 9: Close main and air compressor circuit breakers.

Close the main and air compressor circuit breakers located in the breaker panel. The air compressor will operate and start to develop air. The compressor air output must not exceed 25 psi and should be regulated (by the regulator knob) to 20 psi. The reason for this pressure is to prevent damage to the tower and seal during raising.

Step 10: Raise the tower.

- With no more than 25 psi, close the quarter turn valve at the bottom of the tower and guide the power cable as the tower raises.
- Stop the tower when it reaches the desired height (28 feet maximum).

Step 11: Turn on the floodlight circuit breakers.

Turn on the desired circuits breakers at the breaker panel located in the engine compartment.

NOTE:

The maximum power rating for the generator is 7,000 watts.

Step 12: Install and adjust the tripods.

The tripods can be installed up to 150-feet away from the unit. Each tripod contains two 500-watt bulbs and can be adjusted both vertically and horizontally.

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

Step 13: Inspect during operation.

You should inspect the unit periodically during operation to ensure it is functioning properly. Every 8 hours the light should be turned off and engine shut down to check the engine and compressor oil levels, engine fuel level, and observe the entire unit for leaks.

Step 14: Shutdown the unit.

Always remove all load from the engine prior to shutdown. With the load removed (circuit breakers open), place the run/stop switch to the “stop” position.

Step 15: Lower tower.

The tower is lowered by opening the quarter turn valve at the bottom of the tower. The quarter turn valve should remain open at all times except when the tower is raised.

Step 16: Store floodlight unit.

The floodlight set is a self-contained unit and should be stored in this manner. When the unit is not in use the tower should be in its horizontal storage position and the power cords, tripod lights, and tower T-bar properly stowed. Close and secure all doors.

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

Review Questions for Operation

Question	Answer
1. The TF-1 floodlight can operate in a range of minus 25 degrees F to 125 degrees F.	a. True b. False
2. How many seconds should you depress the preheat button during extreme cold weather?	a. 30 b. 45 c. 60 d. 90
3. Which two buttons must be depressed at the same time for the starter motor to be energized?	a. Crank and start b. Crank and preheat c. Start and preheat d. Start and run
4. How much deflection is allowed on the compressor V-belt?	a. 1/4-inch b. 1/2-inch c. 3/4-inch d. 1-inch
5. The compressor air output must not exceed ____ psi and should be regulated (by the regulator knob) to 20 psi.	a. 20 b. 25 c. 30 d. 35
6. What is maximum height of the tower?	a. 15 feet b. 20 feet c. 25 feet d. 28 feet

NOTE: After completing all lessons for Telescopic Flood Lighting Set, see your Unit Education and Training Manager to take the following mandatory certest:

Test no.
8075

Title
Specific Contingency Responsibilities – Power Pro

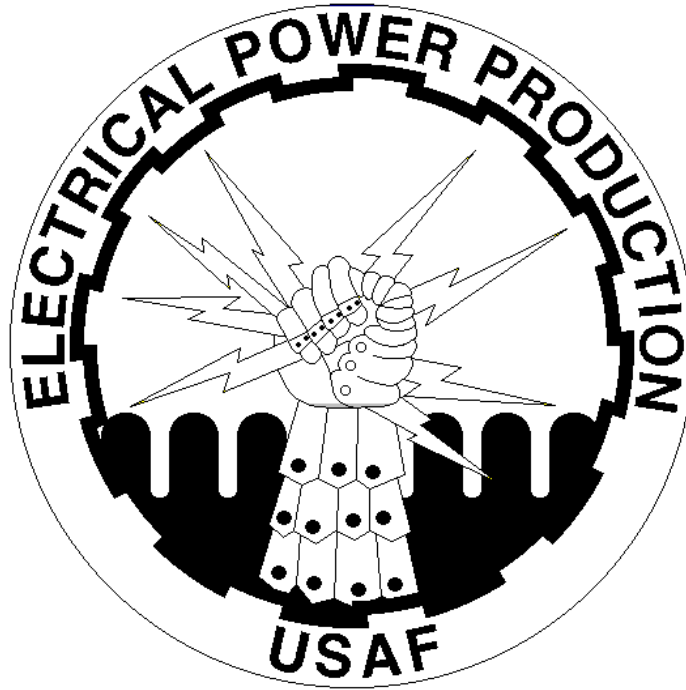
Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

OPERATION

Performance Checklist		
Step	Yes	No
Did trainee:		
1. Install the floodlight set as outlined in AFQTP 3E0X2-30.2.2.2.1?		
2. Inspect the engine?		
3. Inspect the air compressor?		
4. Inspect the tower?		
5. Ensure all circuit breakers were off?		
6. Preheat the engine?		
7. Start the engine?		
8. Allow the engine RPM to stabilize before load was applied?		
9. Close the main and air compressor circuit breakers?		
10. Raise the tower?		
11. Turn on the floodlight circuit breakers?		
12. Install and adjusted the tripods?		
13. Inspect during operation?		
14. Shutdown the unit?		
15. Lower the tower?		
16. Store the floodlight unit?		
17. Document actions?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.



TELESCOPIC FLOOD LIGHTING SET

MODULE 30

AFQTP UNIT 2

MAINTENANCE (30.2.2.2.3.)

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

MAINTENANCE

Task Training Guide

STS Reference Number/Title:	30.2.2.2.3., Maintenance
Training References:	<ul style="list-style-type: none">• Applicable Technical Order• Local Procedures
Prerequisites:	<ul style="list-style-type: none">• Possess a 3E032 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none">• Model TP-5A4-DC Floodlight set• Personal safety equipment• General tool kit
Learning Objective:	<ul style="list-style-type: none">• Maintain the telescopic flood lighting set, model TP-5A4-DC.
Samples of Behavior:	<ul style="list-style-type: none">• The trainee will maintain the telescopic flood lighting set, model TP-5A4-DC.
Notes:	
<ul style="list-style-type: none">• To successfully complete this element follow the steps outlined in the applicable technical manual exactly--no exceptions.• If this model of floodlight set is not available, modify this AFQTP to certify the trainee on the model you have.• Any safety violation is an automatic failure.	

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

MAINTENANCE

Background: Maintenance levels vary from routine maintenance up through overhaul. Some of the more common maintenance is mentioned here. Performing maintenance at the proper time will increase the life of the system. Every 8 hours of continuous operation, check the engine and air compressor oil, air filters on the engine and air compressor. Any maintenance being performed should be accomplished using the applicable Technical Order.

To Perform the tasks follow these steps:

Step 1: Perform 8 hour operational inspection.

Shut unit down and service the engine oil and fuel levels, compressor oil level, and clean air filters as required.

Step 2: Perform 50 hour operational inspection.

Change compressor oil, drain and clean the fuel sediment bowl and lubricate the telescoping tower.

Step 3: Perform 100 hour operational inspection.

Change engine oil and check and adjust compressor V-belts.

Step 4: Perform 200 hour operational inspection.

Change engine oil and filter, check engine valve clearance, and rocker assembly.

HINT:

All internal engine maintenance must be performed by fully qualified personnel.

Step 5: Perform 500 hour operational inspection.

Change primary fuel and air filters, adjust valves, change V-belts, lubricate chassis, re-torque head bolts, and change tower seals.

Step 6: Annotate performed maintenance on the applicable historical record.

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

**Review Questions
for
Maintenance**

Question	Answer
1. During continuous operation, how often should the engine be shutdown and the oil serviced?	a. 4 hours b. 6 hours c. 8 hours d. 10 hours
2. What interval is the air compressor oil changed?	a. 10 hours b. 20 hours c. 40 hours d. 50 hours
3. What interval is the engine oil changed?	a. 100 hours b. 200 hours c. 300 hours d. 500 hours

NOTE: After completing **all** lessons for Telescopic Flood Lighting Set, see your Unit Education and Training Manager to take the following **mandatory** certest:

Test no.
8075

Title
Specific Contingency Responsibilities – Power Pro

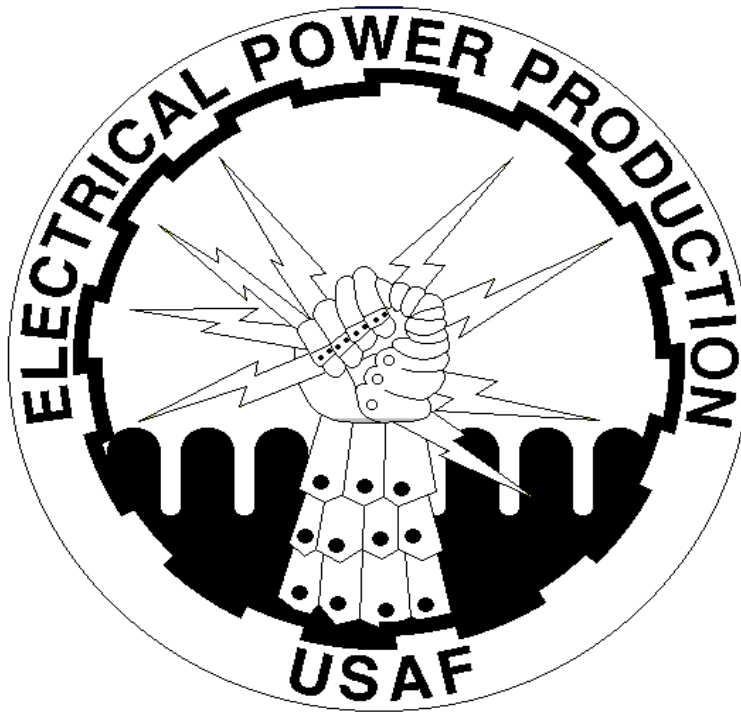
Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

MAINTENANCE

Performance Checklist		
Step	Yes	No
1. Performed the 8 hour operational inspection?		
2. Performed the 50 hour operational inspection?		
3. Performed the 100 hour operational inspection?		
4. Performed the 200 hour operational inspection?		
5. Performed the 500 hour operational inspection?		
6. Annotated performed maintenance on the applicable historical record?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.



MOBILE GENERATORS

MODULE 30

AFQTP UNIT 2

INSTALL/OPERATE (30.2.4.1.1.)

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

INSTALL/OPERATE

Task Training Guide

STS Reference Number/Title:	30.2.4.1.1., Install/Operate
Training References:	<ul style="list-style-type: none">• 35C2 series Technical Orders• Local Procedures
Prerequisites:	<ul style="list-style-type: none">• Possess a 3E032 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none">• General tool kit• Personal safety equipment
Learning Objective:	<ul style="list-style-type: none">• Install and operate a mobile generator set.
Samples of Behavior:	<ul style="list-style-type: none">• The trainee will install a mobile generator set.• The trainee will be able to name all the switches and meters used to operate a mobile generator set.
Notes:	
<ul style="list-style-type: none">• To successfully complete this element follow the steps outlined in the applicable technical manual exactly--no exceptions.• Any safety violation is an automatic failure.	

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

INSTALL/OPERATE

Background: The primary technical reference used for the development of this AFQTP was the 35C2-3-442-11, MEP-007B Technical Order. Installation of the mobile generator set involves a minimum amount of basic planning and execution steps. Planning is the key in every endeavor you as a power production technician will under take, that is, unless you like doing things over and over again. The first step is to determine the exact location where the generator will be installed. When making your determination: ensure the foundation is stable and level, the possibility of utilizing existing grounding systems, facilitate refueling, length of generator cable runs, noise factor for the customer and direction of the prevailing wind just to name a few.

Now that the generator has been installed it's time to operate the generator. This AFQTP will cover operation of the generator set and very little about the actual start-up and shut-down procedures

Mobile Generator Installation.

To Perform the tasks follow these steps:

Step 1: Plan installation.

Choose a site that is level, clear of obstacles, and with ample ventilation. Ensure the ground is as level as possible. Mobile units are designed to operate satisfactorily up to 15 degrees out of level. Ensure the foundation is solid enough to support the weight. If the site is temporary, move the generator as close to the work site as practical. Use planks, logs, or other material to establish a solid foundation.

SAFETY:

DO NOT OPERATE THE GENERATOR SET IN AN ENCLOSED AREA UNLESS THE EXHAUST GASES ARE PIPED TO THE OUTSIDE. INHALATION OF EXHAUST FUMES WILL RESULT IN SERIOUS INJURY OR DEATH.

Step 2; Ground the generator.

The generator must be grounded prior to operation. The ground can be an underground metallic water piping system, a driven metal rod, or a buried metal plate. A ground must have a minimum diameter of 5/8 inch solid rod or 3/4 inch if pipe, driven at least eight feet into the ground. If a ground plate is used, it must consist of a minimum area of 9 square feet (3-feet by 3-feet) and must be buried a minimum depth of 4 feet.

Bolt or clamp at least a No. 6 AWG copper wire from the generator grounding stud to the earth ground.

SAFETY:

DO NOT OPERATE THE GENERATOR SET UNLESS THE GROUND TERMINAL STUD HAS BEEN CONNECTED TO A SUITABLE GROUND. ELECTRICAL FAULTS IN THE GENERATOR SET, LOAD LINES OR LOAD EQUIPMENT CAN CAUSE INJURY OR ELECTROCUTION FROM CONTACT WITH AN UNGROUNDED SYSTEM.

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

Step 3: Connect the auxiliary fuel line (if applicable).

Position the generator and fuel system a maximum of 25 feet apart and no more than 12 feet below the transfer pumps. Exceeding these limits will place undue strain on the fuel transfer pumps and cause possible damage or prevent them from functioning properly.

Step 4: Insert load cables through protective sleeve and connect to the load terminal board.

Attach cables to their respective load terminals, one cable to each terminal. Tighten the four terminal nuts with the provided wrench. The proper color sequence for four conductor SO cable is: L1-BLACK , L2-RED, L3-WHITE , and L0-GREEN. Five conductor (wire) SO cable is: L1-BLACK, L2-RED, L3-BLUE, L0-WHITE and GRD.-GREEN. If you are the original power source, L0-White and GRD.-Green may be connect to the same terminal.

Generator Operations:

Step 1: Start generator set.

Depress the DC Control Circuit Breaker, hold Start-Stop-Run switch to **START** position until engine starts and oil pressure increases to 25 psi, AC Volt meter indicates voltage, and the Low Oil Pressure Indicator extinguishes then release Start-Stop-Run switch to *run* position.

Step 9: Ensure Amps-Volts selector switch is on.

Rotate the Voltage Adjust control to obtain the required voltage as indicated on the AC Volt meter.

Step 10: Adjust for rated frequency.

Depress the Locking Button and slide engine manual speed control in or out to obtain the approximate rated frequency. Then release the Locking Button and rotate the throttle knob clockwise or counterclockwise to obtain the precise frequency desired.

HINT:

Operate engine at least five minutes for warm-up.

Step 11: Apply the load.

Apply load by holding Load Circuit Breaker switch to the **close** position until the Closed Circuit Breaker indicator light illuminates.

Step 12: Observe the Kilowatt meter.

If more than rated KW is indicated reduce the load by load shedding. If the load is less than 25% of generator load rating, you should use a smaller generator.

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

Step 13: Observe the Percent Rated Current meter.

Rotate amps-volts selector switch to each phase position and monitor Percent Rated Current Meter. If more than rated load is indicated for any position, reduce or balance the load.

Step 14: Monitor engine performance.

Monitor engine and generator indicators and performance to ensure continued operation every hour. Use an approved Air Force form to conduct the inspection and document your findings on this form. As a minimum, check and document the following:

- Check lube oil level and add as required.
- Inspect exhaust extension (for generator sets operating indoors) for tightness, and leakage at seams and point of coupling.
- Check the fault indicator panel using the test switch.
- Check the control cubicle panel and ensure the battery charging ammeter coolant temperature gauge (180 to 200 degrees), oil pressure gauge (40 to 60 psi), volts AC meter (120/208 or 240/416 volts AC), percent rated current meter (less than 100 percent), and the frequency meter (50 or 60 hertz) are all within operating range.

Step 15: Shutdown Generator.

- Remove the load from the generator by placing the circuit breaker switch to the open position.
- Reduce frequency to 57 Hz
- Turn voltage regulator fully counter clockwise
- Allow the generator to operate with no-load for three to five minutes to cool the engine down.
- Place the Start-Run-Stop switch to the stop position.
- Perform post-operational inspection when engine has cooled to ambient temperature:
 - ♦ Check and adjust the fluid levels (i.e. oil, water, fuel, and electrolyte).
 - ♦ Check, adjust, or replace the v-belts as applicable.
 - ♦ Complete the required operational and historical documentation.
 - ♦ Secure unit access doors.

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

**Review Questions
for
Install/Operate**

Question	Answer
1. How many feet must the generator be from the auxiliary fuel supply?	a. 10 b. 20 c. 25 d. 30
2. How many degrees out of level can the generator be and still operate satisfactorily?	a. 3 b. 10 c. 12 d. 15
3. What is the minimum gauge of wire used to ground the generator?	a. 3 AWG b. 6 AWG c. 10 AWG d. 12 AWG
4. When do you release the Start-Stop-Run switch?	a. Oil pressure gauge indicates 25 psi b. AC volt meter indicates voltage c. Low oil pressure indicator goes out d. All of the above
5. How many minutes do you allow for the engine to warm-up?	a. 3 b. 5 c. 10 d. 15
6. What would be your first step, if one phase on the percent rated current meter indicates more than 100 percent?	a. Monitor generator closely b. Shut down the generator c. Load shed d. Both a and b are correct

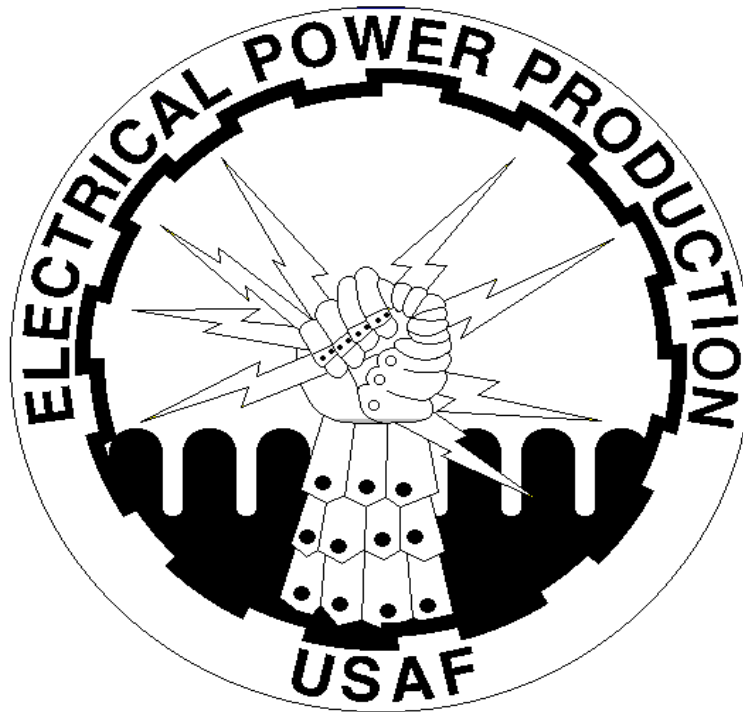
Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

INSTALL/OPERATE

Performance Checklist		
Step	Yes	No
Did trainee:		
1. Chose a level site?		
2. Ensured the foundation was solid?		
3. Ensured proper ventilation for an indoor operation??		
4. Grounded the generator?		
5. Used at least a No. 6 AWG ground wire?		
6. Connected the auxiliary fuel line?		
7. Inserted load cables through protective sleeve and connected to the load terminal board?		
8. Started the generator set?		
9. Ensured the amps-volts selector switch was on?		
10. Adjusted for rated frequency?		
11. Applied load to the generator?		
12. Observed kilowatts meter?		
13. Observed percent rated current meter?		
14. Monitored engine performance?		
15. Document all actions on the AF Form 487?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.



MOBILE GENERATORS

MODULE 30

AFQTP UNIT 2

GROUND GENERATORS (30.2.4.1.2.)

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

GROUND GENERATORS

Task Training Guide

STS Reference Number/Title:	30.2.4.1.2., Ground Generators
Training References:	<ul style="list-style-type: none"> • CD-ROM 3E0x2-26C Grounding Fundamentals • 35C2 series Technical Orders • Local Procedures
Prerequisites:	<ul style="list-style-type: none"> • Possess a 3E032 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none"> • General tool kit • Personal safety equipment • Sledge hammer • Vibroground tester
Learning Objective:	<ul style="list-style-type: none"> • Ground a generator set.
Samples of Behavior:	<ul style="list-style-type: none"> • Trainee will be able to name the different kinds of grounds. • Trainee will be able to install ground rods and connect grounding conductor.
Notes:	
<ul style="list-style-type: none"> • To successfully complete this element follow the steps outlined in the applicable technical manual exactly--no exceptions. • Any safety violation is an automatic failure. 	

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

GENERATOR GROUNDING

Background: Distribution system grounds are very important. They allow fuses and other system safety components to operate properly. The most elaborate grounding system you can design may prove ineffective unless the connection of the system to earth is adequate and has a sufficiently low resistance. For safety reasons, electric power systems and equipment are intentionally grounded so that insulation failure results in operation of protective devices to de-energize circuits, thus reducing risk to personnel. The word grounding is used commonly in electric power system work to cover both system grounding and equipment grounding; however, the distinction between system and equipment grounding should be recognized.

A system ground is a connection to ground from one of the conductors of an electric circuit, normally the neutral conductor. The purpose of electrical system grounds is to stabilize voltage to ground and give a low impedance path for fault current. Equipment grounding involves interconnecting and connecting to earth all noncurrent carrying metal parts of an electrical wiring system and equipment connected to the system. The equipment ground is connected to an electrical system ground (neutral) only at the service entrance of a building and should not exceed 25 ohms to ground. The purpose of grounding equipment is to ensure personnel safety, by reducing any charge in an equipment item to near zero volts with respect to ground, without causing a fire or explosive hazard, until the circuit protective device clears the fault.

To accomplish this lesson complete: CD-ROM, 3E0X2-26C, Grounding Fundamentals

NOTE: After completing this lesson, you may see your Unit Education and Training Manager to take the following optional certest:

<u>Test no.</u>	<u>Title</u>
8087	Grounding Fundamentals

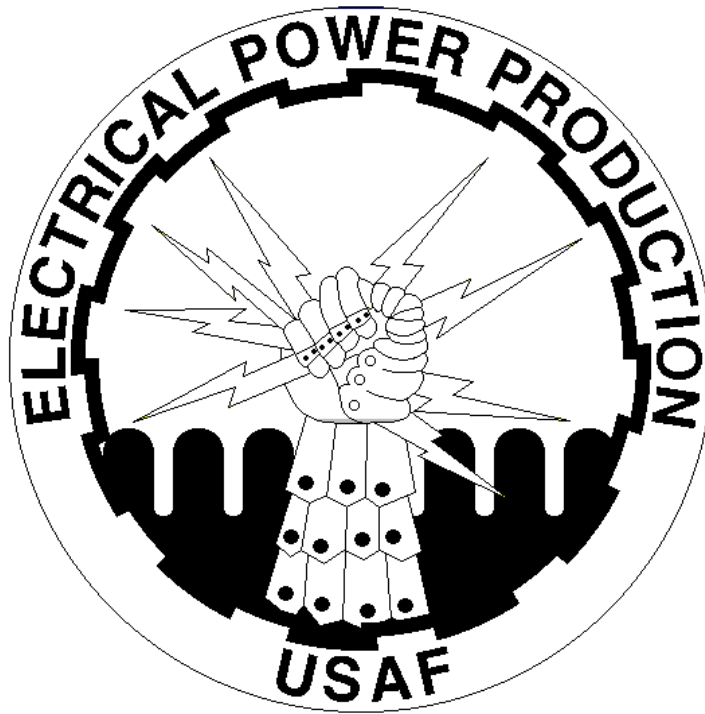
Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

GENERATORS GROUNDING

Performance Checklist		
Step	Yes	No
Did trainee:		
1. Installed the ground		
2. Installed the ground wire		
3. Tested the ground		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.



MOBILE GENERATORS

MODULE 30

AFQTP UNIT 2

PHASE GENERATORS (30.2.4.1.3.)

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

PHASE GENERATORS

Task Training Guide

STS Reference Number/Title:	30.2.4.1.3., Phase Generators
Training References:	<ul style="list-style-type: none"> • AFQTP 3E0X2-12 • 35C2 series Technical Orders • Local Procedures
Prerequisites:	<ul style="list-style-type: none"> • Possess a 3E032 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none"> • General tool kit • Multimeter • Personal safety equipment • Phase rotation meter
Learning Objective:	<ul style="list-style-type: none"> • Determine phase sequence of the generator and equipment.
Samples of Behavior:	<ul style="list-style-type: none"> • Trainee will be able demonstrate the use of the phase rotation meter.
Notes:	
<ul style="list-style-type: none"> • To successfully complete this element follow the steps outlined in the applicable technical manual exactly--no exceptions. • Any safety violation is an automatic failure. 	

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

PHASE GENERATORS

Background: Generators load connections are typically marked (L1, L2, L3, and L0) to indicate the order in which the generator provides phase sequence. The phase sequence on a three-phase circuit directly affects the operation of the equipment on the circuit. Therefore, the way you connect the generator to the load will directly affect the equipment's operation. One of the methods of determining the phase sequence of the equipment you are connecting to, is by determining the sequence the commercial or primary power is feeding the circuit. To determine the primary phase sequence we have what is commonly referred to as a phase sequence meter as illustrated below. To properly operate this meter, please refer to AFQTP 3E0X2-12. When this meter isn't available or there is no "primary" power source, always connect as stated in 3E0X2-30, 30.2.4.1.1.

To Perform These Tasks View: CD-ROM, 3E0X2-12C, Power Production Test Equipment.

NOTE: In the CD-ROM there are tests after each section. Complete each section and answer the questions.

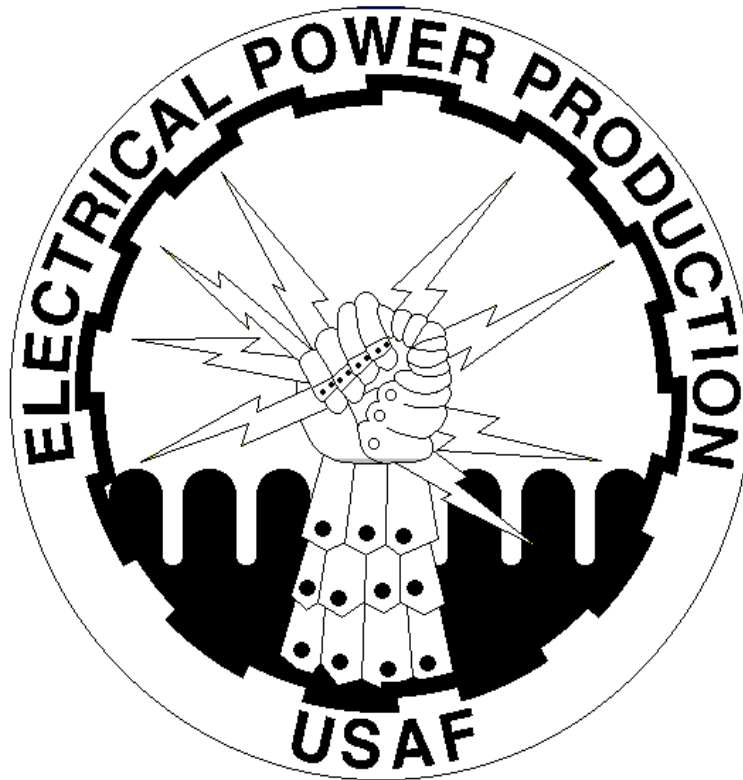
Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

PHASE GENERATORS

Performance Checklist		
Step	Yes	No
Did trainee:		
1. Determined phase sequence?		
2. Determined phase rotation?		
3. Used the phase rotation meter?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.



MOBILE GENERATORS

MODULE 30

AFQTP UNIT 2

PARALLEL GENERATORS (30.2.4.1.4.)

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

PARALLEL GENERATORS

Task Training Guide

STS Reference Number/Title:	30.2.4.1.4., Parallel Generators
Training References:	<ul style="list-style-type: none"> • 35C2 series Technical Orders • Local Procedures
Prerequisites:	<ul style="list-style-type: none"> • Possess a 3E032 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none"> • General tool kit • Personal safety equipment
Learning Objective:	<ul style="list-style-type: none"> • Parallel generators.
Samples of Behavior:	<ul style="list-style-type: none"> • Trainee will use a phase rotation meter. • Trainee will operate generators in parallel.
Notes:	
<ul style="list-style-type: none"> • To successfully complete this element follow the steps outlined in the applicable technical manual exactly--no exceptions. • Any safety violation is an automatic failure. 	

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

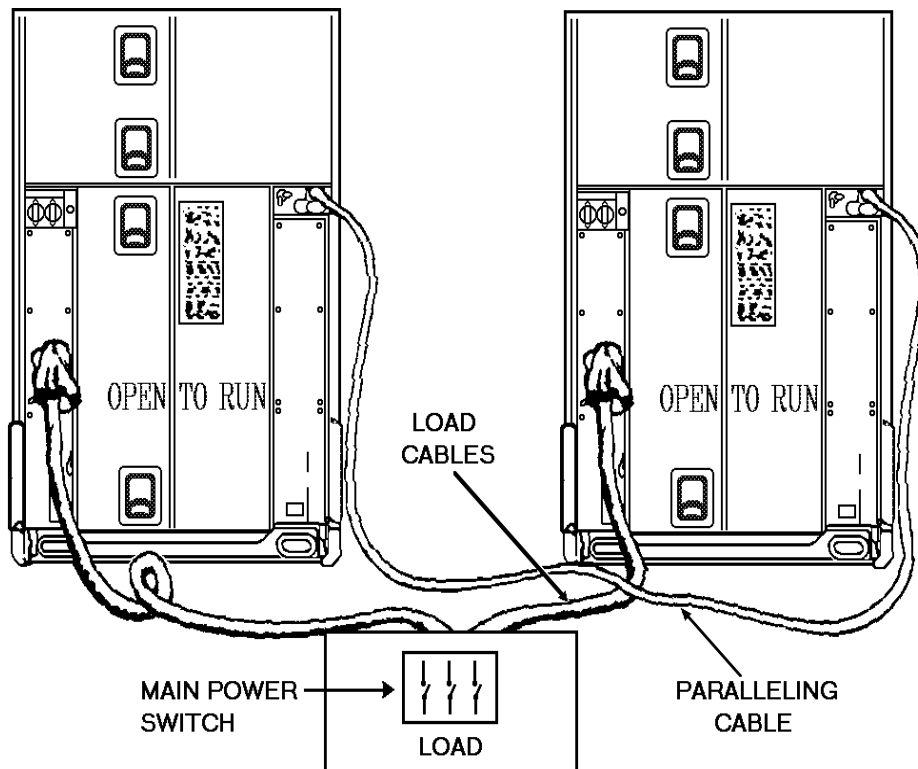
PARALLEL GENERATORS

Background: Parallel operation is defined as operating two or more AC generators electrically-magnetically in-connected together. The process of paralleling is synonymous with the word synchronizing, both words basically mean the same. Parallel is defined: Readily compared, companion. To show something equal. To place so as to be parallel in direction. Synchronize is defined: To happen at the same time. To make motion exactly simultaneous with the action. We will use the word parallel. The ability to parallel generators is what separates the true power personnel from anyone off the street who can start a car. We will be discussing why it is necessary to operate in parallel, and how to set-up for parallel operations.

During your tour as a power production technician you will come under a multitude of operational situations and the more you know about your job and your equipment's capabilities, the quicker you will be able to accomplish the task before you. You may be assign to a communications type unit, were you can't shutdown the generator to perform maintenance. You will be required to parallel an additional generator with the on-line generator, to prevent an electrical power interruption. This is just one of many situations you may find yourself in, the question is, are you capable of performing this task? Now, the question is, how to set-up for parallel operations?

Since the word parallel means companion, the first step is to ensure both generators are electrically the same the same (Frequency, Phase rotation, phase relationship, and voltage). Fig. #1 is a common set-up for generator parallel operations, the box between the generators is typically called a parallel box. The parallel box has two in-puts with isolation breakers and one out-put source (terminal lugs or an actual cannon plug) to the load. The parallel cables are installed to facilitate governor operations between the two units. We have covered, why you may need to operate in parallel and how to set-up your equipment, it's time to start the performance portion.

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.



* PRECISE GENERATOR SETS ONLY

Figure 1, MEP Series Generators in Parallel.

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

SAFETY:

IF THERE IS NO PARALLEL BOX YOU MAY BE REQUIRED TO CONNECT THE OUTPUT CABLES TO A COMMON BUS SUCH AS THE LOAD TERMINAL BOARD. THE LOAD TERMINAL BOARD WILL ALWAYS BE ENERGIZED AS LONG AS ONE OF IS OPERATING. THEREFORE THE LOAD TERMINAL BOARD ON THE UNITS NOT ON-LINE ARE HOT AND SHOULD NOT BE WORKED ON OR AROUND WITHOUT TAKING PROPER PRECAUTIONS.

To Perform the tasks follow these steps:

Step 1: Label the units.

One unit will be called the running unit and the other unit will be called the incoming unit. The running unit is the unit on-line and the incoming unit will be the unit that is to be placed in parallel operation with the running unit.

Step 2: Start the running unit.

- Start the running unit and adjust voltage and frequency to operating range.
- Close the main circuit breaker and allow it to pickup load.
- Observe all instruments for normal readings with emphasis on kilowatts (percent power), frequency, voltage and amperage (on all three phases).
- Place operation switch to the parallel operation position. (optional)

Step 3: Start the incoming unit.

- Start the incoming unit and adjust voltage and frequency.
- Set operation switch to parallel operation position, synchronizing lights will illuminate going from bright to dark.

Step 4: Bring incoming unit on line.

- Adjust the engine speed of the incoming unit to match that of the running unit, while observing the synchronizing lights. Adjust until synchronize lights are blinking slowly.
- Adjust voltage on the incoming unit to match running unit.
- Close load contactor when the synchronizing lights are dark, and increase engine torque (fuel) to pick-up load

NOTE:

Phase sequence has to do with the order in which the generator windings are connected. If phase sequence is not correct, the synchronizing lights will not blink simultaneously on and off.

Step 5: Check both units for desired operation.

Ensure both units have sufficient load as to not created a motorize situation. Adjust as desired.

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SAFETY:

SHOULD EITHER GENERATOR SET LOSE SPEED, “BUCK”, OR “SHUDDER”, WHEN THE INCOMING UNIT IS CONNECTED TO THE DISTRIBUTION FEEDER LINES, IMMEDIATELY OPEN THE MAIN CIRCUIT BREAKER OF THE INCOMING UNIT TO OPEN AND RECHECK PARALLEL SET-UP PROCEDURES.

Step 6: Shut down the unit.

Transfer the load from one unit to the other unit by reducing the fuel on one unit, opening it's main circuit breaker before shutting down the unit, allowing the engine to operate with no load for about five minutes, and performing post-operational inspection, and document actions.

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**Review Questions
for
Parallel Generators**

Question	Answer
1. What are the four factors involved in paralleling generators?	a. Frequency, voltage, phase sequence, and amperage b. Frequency, voltage, phase sequence and phase relationship c. Frequency, voltage, phase sequence, and kilowatts d. Frequency, voltage, amperage, and kilowatts
2. How are the two parallel units identified?	a. Running and incoming b. Incoming and outgoing c. Faster and slower d. Stopped and started
3. When is the load circuit breaker closed on the incoming unit?	a. The paralleling lights alternately flash b. The paralleling lights illuminate c. The paralleling lights extinguish d. The running unit reaches 75% load
4. How many minutes do you allow the engine to cool down before shutting down the unit?	a. 10 b. 15 c. 5 a. 2

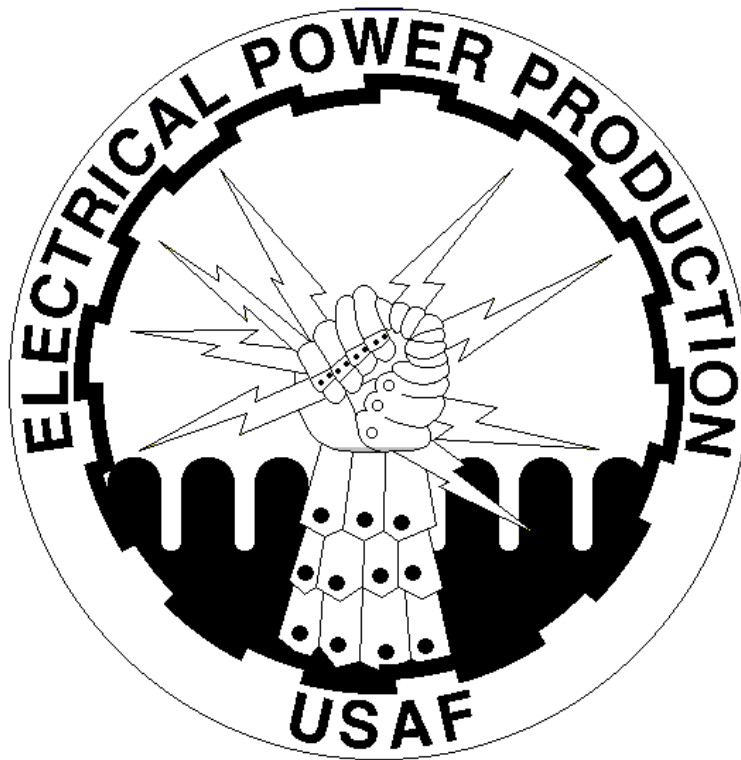
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PARALLEL GENERATORS

Performance Checklist		
Step	Yes	No
1. Labeled the units?		
2. Started the running unit?		
3. Started the incoming unit?		
4. Placed incoming unit on line?		
5. Checked on both units?		
6. Shut down the unit?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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MEP-0012 SERIES GENERATORS

MODULE 30

AFQTP UNIT 2

INSTALL/OPERATE (30.2.4.2.1.)

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

INSTALL/OPERATE

Task Training Guide

STS Reference Number/Title:	30.2.4.2.1., Install/Operate
Training References:	<ul style="list-style-type: none"> • CD-ROM, (3E0X2C-30.2.4.2, 750 Kilowatt Generator) • TO 35C2-3-474-1 • Local Procedures
Prerequisites:	<ul style="list-style-type: none"> • Possess a 3E032 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none"> • General tool box • Personal safety equipment
Learning Objective:	<ul style="list-style-type: none"> • The trainee will know the steps in installing and operating a MEP- 0012 generator set.
Samples of Behavior:	<ul style="list-style-type: none"> • The trainee will install, start-up, monitor, shut-down MEP-0012. • The trainee will know how to ground generator set. • The trainee will know the meters and gauges of the generator set.
Notes:	
<ul style="list-style-type: none"> • To successfully complete this element follow the steps outlined in the applicable technical manual exactly--no exceptions. • Any safety violation is an automatic failure. <p><i>Certification on these tasks requires a minimum of 80 % on the CER-Test administered by the unit Training Manager</i></p>	

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Background: The MEP-0012 generator set is a wheel-mounted, diesel engine driven, prime power generator that produces 750KW at 60 hertz and 625KW at 50 hertz. Review Figures 1 and 2 to become acquainted with the MEP-0012. It is a 3-phase, 4-wire, wye connected, 2400/4160 volts AC at 60 hertz and 2200/3800 at 50 hertz generator. The generator rotates at 1800 rpm at 60 hertz and 1500 rpm at 50 hertz. Installation of the generator set involves placing it on a stable, level foundation in a well-ventilated area, electrically grounding the generator set, connecting the generator set to an auxiliary fuel supply, setting up the start cart, and connecting the generator output to the load distribution lines through the switch-gear. The main control console houses all the meters and gauges and can be installed in remote locations. Operating the generator consists of starting, monitoring, and shutting down the generator set.

HINT:

If you are going to run the MEP 0012 generators in parallel, the battle shorts must be up to prevent a ground short fault from knocking one or both generators off line.

To accomplish this lesson complete: CD-ROM, (3E0X2C-30.2.4.2, 750 Kilowatt Generator)

NOTE: After completing this lesson, see your Unit Education and Training Manager to take the following **mandatory** certests:

<u>Test no.</u>	<u>Title</u>
8023	750 QTP, Lesson One
8024	750 QTP, Lesson Two
8025	750 QTP, Lesson Three
8026	750 QTP, Lesson Four
8027	750 QTP, Lesson Five

The *Task Evaluation Checklists*, located on the above CD-ROM, will be used as the *Performance Checklists*.

To find the Checklists perform the following:

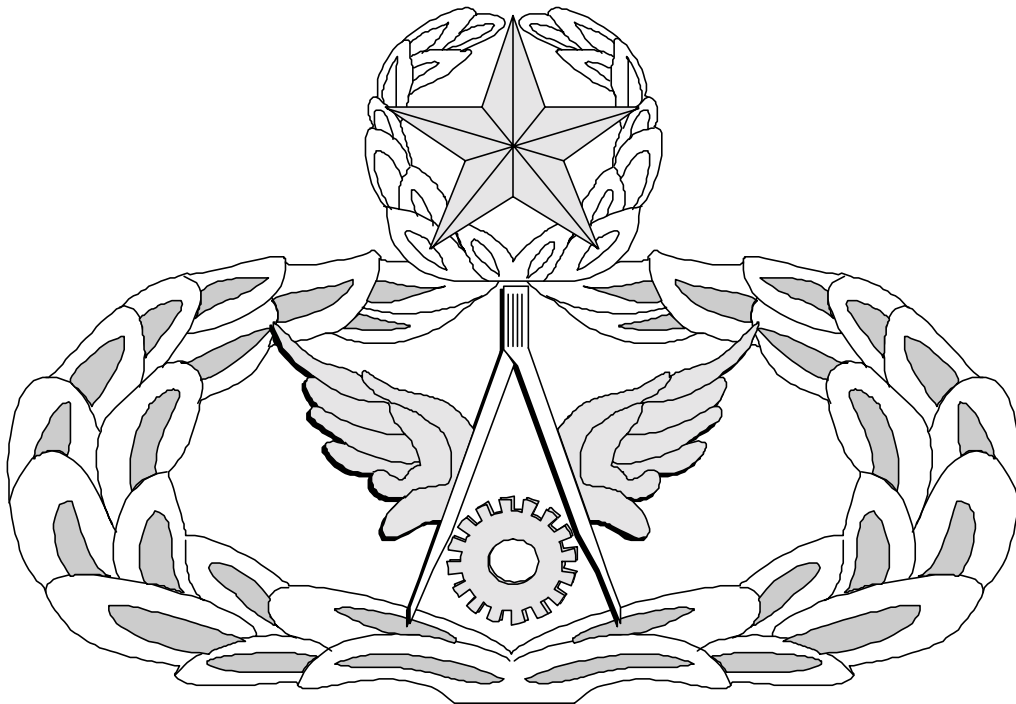
- open "Explorer"
- click the CD-ROM drive....example: 750(D:)
- double click "750" on the right column
- double click "Docs" on the right column
- double click "QTP_TG"
- the first checklist is located on Page A-8

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Air Force Civil Engineer

QUALIFICATION TRAINING PACKAGE (QTP)

REVIEW ANSWER KEY



For
ELECTRICAL POWER PRODUCTION

(3E0X2)

MODULE 30

AFSC SPECIFIC CONTINGENCY RESPONSIBILITIES

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Key-1

INSTALLATION

(3E0X2-30.2.2.2.1)

Question	Answer
1. All the floodlight sets used in the Air Force are designed as fast deployment floodlight units for use as an emergency lighting source in remote areas.	a. True
2. What are the flood light support stands and outriggers used for?	c. Support the light set and prevent the unit from rolling
3. Which position must the staging pin be in to allow the tower to be moved from the horizontal to the vertical position?	c. Ready

OPERATION

(3E0X2-30.2.2.2.2)

Question	Answer
1. The TF-1 floodlight can operate in a range of minus 25 degrees F to 125 degrees F.	a. True
2. How many seconds should you depress the preheat button during extreme cold weather?	c. 60
3. Which two buttons must be depressed at the same time for the starter motor to be energized?	c. Start and preheat
4. How much deflection is allowed on the compressor V-belt?	c. 3/4-inch
5. The compressor air output must not exceed ____ psi and should be regulated (by the regulator knob) to 20 psi.	b. 25
6. What is maximum height of the tower?	d. 28 feet

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MAINTENANCE

(3E0X2-30.2.2.2.3)

Question	Answer
1. During continuous operation, how often should the engine be shutdown and the oil serviced?	c. 8 hours
2. What interval is the air compressor oil changed?	d. 50 hours
3. What interval is the engine oil changed?	b. 200 hours

INSTALL/OPERATE

(3E0X2-30.2.4.1.1)

Question	Answer
1. How many feet must the generator be from the auxiliary fuel supply?	c. 25
2. How many degrees out of level can the generator be and still operate satisfactorily?	d. 15
3. What is the minimum gauge of wire used to ground the generator?	b. 6 AWG
4. When do you release the Start-Stop-Run switch?	d. All of the above
5. How many minutes do you allow for the engine to warm-up?	b. 5
6. What would be your first step, if one phase on the percent rated current meter indicates more than 100 percent?	c. Load shed

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PARALLEL GENERATORS

(3E0X2-30.2.4.1.4)

Question	Answer
1. What are the four factors involved in paralleling generators?	b. Frequency, voltage, phase sequence and phase relationship
2. How are the two parallel units identified?	a. Running and incoming
3. When is the load circuit breaker closed on the incoming unit?	c. The paralleling lights extinguishes
4. How many minutes do you allow the engine to cool down before shutting down the unit?	c. 5

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